THE GENUS CARNEOCEPHALA

(HOMOPTERA, CICADELLIDAE)

by

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THE GENUS CARNEOCEPHALA (HOMOPTERA, CICADELLIDAE)

The genus Carneocephala was erected by Ball in 1927 for a small genus of leafhoppers previously included in the genus Draeculacephala. Before the erection of Draeculacephala by Ball in 1901, the above mentioned forms were listed with Diedrocephala, which genus is now included in Graphocephala. The earliest named species were called Tettigonia, a name preoccupied in the Orthoptera.

According to the present scheme of classification, Carneocephala stands as a connecting link between Helochara and Draeculacephala, having in general the size, length of vertex and pronotum of the former, but the reticulated elytral apex of the latter. The three genera may be separated as follows:

1. Apex of elytra not reticulated, male antennae enlarged and platelike on apical third. ----- Helochara.

   Apex of elytra reticulated, male antennae normal. ----------2.

2 (1). Vertex flat or nearly so, with definite margins, longer than pronotum; front nearly straight in profile marked with parallel lines on each side. ----- Draeculacephala.

Vertex convex, with margins rounding, shorter than or about as long as pronotum; front convex and mottled or at most with interrupted lines. ------- Carneocephala.

The genus seems to be mostly tropical and subtropical though a few forms have been taken in the north temperate zone. It has never been recorded from any other than the western hemisphare.

The species of this genus seem to live mostly in alkaline areas,but are not entirely confined there. In the United States,various species have been taken on the following plants: Bermuda grass, alfalfa,cotton,Dondia,Salicornia,Atriplex,and Bates.

The main characteristic upon which the species have been separated has been the structure of the head. The convexity of the disc and lateral margins of the vertex,the comparative width and length of the vertex and pronotum,the position and size of the ocelli, the inflation of the front and the extent of the reticulation of the apex of the elytra have all proved to be characters of utmost importance. In addition, most of the species have

size, general color and color markings, constant enough in nature, so that they can be set out readily without making detailed measurements. The genitalia, while of secondary importance, possess differences which in certain instances have been of value. In the external genitalia of the female, the characters of use are the comparative lengths of the pygofer, the ultimate and penultimate segments of the abdomen, and the shape of the posterior margin of the last ventral segment. In the male genitalia, the shape of the valve, plates, length compared to the last abdominal segment and pygofer have been good characters. In the internal genitalia, the structure is complicated and generally found to be of little or no value. The author has, however, found that the dorsal and lateral views of the oedagus have been of some value in the final separation of species.

Through a loan from the Vienna museum of Signoret's type of T. reticulata, the author has concluded that the common Carneocephala in the Southern United States is Riley's flaviceps and not reticulata. Through a loan from the British museum of one of Fowler's types of T. diducta, the author has

concluded that diducta is a synonym of sagittifera (Uhler) and not of reticulata.

Five species were previously known in this genus. In this paper, one species is restored, and three are described as new.

Description of the Genus

Similar to Draeculacephala in general appearance and reticulate apical portion of elytra, but with front strongly inflated and rounding over to vertex. Color varying from light yellowish green through dark green to brownish black. Front usually lightly mottled with fulvous.

Head about as wide as pronotum, wider than long. Vertex convex, usually finely granulated, margins rounded, apex usually blunt but sometimes acute; frontal sutures distinct; ocelli on disc and about equidistant from posterior and lateral margins. Pronotum subhexagonal as in Helochara, more coarsely granulated than vertex, lateral margins diverging posteriorly, posterior margin emarginate. Elytra narrow, longer than abdomen in female, much longer in male.

Female last ventral segment about twice as long.

as preceding, posterior margin variable, but with a median lobe and sinuated tto lateral angles. Pygofer sparsely spined, over twice as long as last ventral segment, never exceeded by ovipositor. Male last ventral segment longer than preceding, posterior margin slightly concave; valve subtriangular, margins straight or rounding; plates longer than last ventral segment and bearing slender finger-like processes which bend dorsad over pygofer tip.

Internal male genitalia similar to Draeculacephala; connective Y - shaped; lobe of oedagus when viewed dorsally, subovate and bearing one pair of short processes, connected at base to two pairs of processes, one short and truncate, the other long, slender and curved. In dorsal view, the processes are referred to as being dorsal, ventral or posterior. (See plate II, figure 8).

Key to Species

1. Vertex decidedly longer than pronotum --------
floridana (Ball).

Vertex shorter or only about equalling pronotum ----------2.

2.(1). With many reticulations in apex of elytra-3.

With few reticulations in apex of elytra-4.

3 (2). Vertex acute, concave between ocelli; dark green species --------*fulgida* sp. n.

Vertex blunt, concave between ocelli; lighter green species -- *flaviceps* (Riley).

4 (2). Dark brown species, face dark, veins yellow ---------- *dyeri* (Gibson).

Green or light brown species --------- 5.

5 (4). Larger species, females 6 mm., males 5 mm.; vertex very blunt in females ----------
gillettei (Ball).

Smaller species, females 5 mm., males 4 mm.; vertex more acute in females ---------- 6.

6 (5) Vertex, pronotum and scutellum entirely unmarked---------- *nuda* sp. n.

Vertex, at least, always marked ---------- 7.

7 (6). Light green species, vertex light tawny; pronotum and scutellum unmarked --------

triguttata sp. n.

Brownish-green species, vertex darker; pronotum and scutellum marked --------- 8.

8(7). Vertex nearly uniformly dark fulvous, with few light markings, dark wedge-like spot extending to apex im male, and not entirely surrounded by light markings ----------

reticulata (Signoret).

Vertex light fulvous, with more light markings, wedge-like spot set well back from apex, and usually surrounded by light markings ---

sagittifera (Uhler).

Carneocephala floridana (Ball).

Pls, I and II; figs., 9, a-c.

Draeculacephala floridana Ball, Proc. Ia.Acad. Sci. VIII, p. 72, pl. 6, 1901.

Carneocephala floridana Ball, Fla.Ent.,XI,p.39,1927.

The largest species in the genus and with a very long and acute vertex. Length, female 8.1 mm.; male, 6.5 - 7 mm.

Head, including eyes, slightly wider than pronotum. Vertex, finely granulated, concave when viewed laterally, margins broadly rounding, apex very acute; one-sixth wider than long in female, one-fourth in male; nearly three times as long at middle as against the eyes; ocelli relatively small, slightly closer to posterior than to lateral margin in female.

Pronotum transversely granulated, distinctly shorter than vertex, posterior margin slightly emarginate. Elytra longer than abdomen, reticulations relatively few and extending cephalad of tip of clavus.

External genitalia: Female last ventral segment less than twice as long as preceding, posterior margin with produced lobe on median third and sinuated to lateral margins; pygofer nearly three times as

long as last ventral segment, lateral margins concave preapically. Male last ventral segment longer than preceding; valve with posterior margins rounded; plates with concave margins, failing to reach tip of pygofer and bearing finger-like processes.

Internal male genitalia: Lobe of oedagus broad and nearly evenly rounded, slightly emarginated at tip, apex long and slender in side view, and with single median large tooth-like process on inner margin; posterior processes heavy and with deep emargination at base.

Color: Vertex yellowish green, faintly mottled with fulvous. Apical spot pearly white, surrounded by fuscous band extending one-third the distance of the vertex posteriorly as a single fulvous line, then branching and diverging toward ocelli and terminating in the frontal sutures. Pronotum green on disc, light yellowish green on anterior margin. Scutellum yellowish green. Elytra green, margins and veins pale. Face pale with fulvous markings forming arcs ventrally and mottlings dorsally and with a median fulvous line extending irregularly from clypeus to apex;

thorax yellowish green; abdomen yellow; legs pale, tarsi fulvous.

Distribution: This unique species has hitherto been recorded only from Florida and Georgia. The author has before him specimens from Florida and Brazoria, Cameron, and Aransas counties, Texas.

Dr. E.D. Ball records having taken both nymphs and adults of this species on a mixture of Sea Blite (Salicornia herbacea) and Salt Wort (Batis maritima) growing in profusion on the tide flats along the Atlantic Coast of Florida from Jacksonville to Miami.

Carneocephala fulgida sp. n.

Pl.I,fig.6,a-c; Pl.II,fig.6,a-c

Allied to flaviceps (Riley) but with a more pointed vertex, and of a deeper and more shiny green color. Length, female 5.5 - 6 mm.; male 4.5-5 mm.

Head slightly wider than pronotum. Vertex rather flat except for raised areas near the ocelli, granulated; one-half wider than long, fully twice as long at middle as against the eyes, lateral margins slightly convex, apex relatively acute; ocelli smaller than in flaviceps, about twice as far from lateral as from posterior margin.

Pronotum coarsely granulated, about one-third longer than vertex in both sexes, posterior margin not as deeply emarginate as in flaviceps.

Elytra distinctly longer than abdomen, with nervures distinct, apex reticulated with many broad veins which extend cephalad of tip of clavus.

External genitalia: Female last ventral segment twice as long as preceding, posterior margin with produced lobe on median third and distinctly sinuated to lateral angles; pygofer shorter than in flaviceps and slightly concave preapically. Male last

ventral segment distinctly longer than preceding; valve with posterior margins nearly straight; plates with straight margins, reaching end of pygofer and bearing finger-like processes.

Internal male genitalia: Lobe of oedagus narrower than in flaviceps, posterior and ventral processes more slender.

Color: Vertex fulvous, darker in male, mottled with lighter markings as follows: spot at apex, bands along anterior margins, spots around ocelli with an arc connecting them, and a spot cephalad of the arc; posterior margin yellowish green. Pronotum yellowish green, darker on posterior third. Scutellum yellowish green, slightly darker apically. Elytra shining dark green, apices smoky; veins lighter green, hyaline apically in male. Face fulvous mottled with lighter spots forming indistinct arcs; thorax yellowish green; abdomen yellow with last ventral segment of female slightly fuscous apically. Legs pale, tarsi brownish.

Holotype, male, Lemon Cove, Calif., July 24, 1929, R.H.Beamer. Allotype, female, same data. Paratypes, 10 males and 21 females, same data; 8

males and 3 females, Winters, Calif., August 6, 1929, R.H.Beamer; 26 males and 22 females, Sacramento, Calif., August 7, 1929, L. D. Anderson; 4 males and 4 females, same data, R. H. Beamer; 4 females, Spreckels, Calif., May 14, 1929, G. E. Bensel; 13 females and 9 males, Calif., C. F. Baker.

The external genitalia and heads of the holotype and allotype are figured along with the internal genitalia of a paratype from the same locality.

The name fulgida is proposed for this species because of its shining appearance.

Some paratypes deposited in the United States National Museum; all other types deposited in the Snow Entomological Collection.

Carneocephala flaviceps (Riley)

Pl.Ifig.7,a-c; Pl.II,fig.8,a-c.

Diedrocephala flaviceps Riley, Am. Ent., III, p. 78, 1880.

A rather large species with a blunt,fulvous vertex bearing very large ocelli. Length, female 5 - 6.3 mm.; male 4.5 - 5 mm.

Head as wide as pronotum, wider in female; including eyes, about two and one-half times as broad as long. Vertex convex on disc, finely granulated, margins very rounding; over twice as long at middle as against the eyes, lateral margins convex, apex broadly rounding, ocelli very large, nearer posterior than lateral margins.

Pronotum rather finely granulated, about one-third longer than vertex, posterior margin roundingly but not deeply emarginated.

Elytra longer than abdomen, nervures very distinct, apex reticulated with many broad veins which may extend cephalad of tip of clavus.

External genitalia: Female last ventral segment slightly over twice as long as preceding, posterior margin with broad slightly produced median lobe, only slightly sinuated to rounded lateral angles;

pygofer with straight margins, about two and one-half times as long as last ventral segment. Male last ventral segment barely longer than preceding; valve with posterior margins rounding; plates broad with posterior margins nearly straight, not reaching end of pygofer but bearing finger-like processes which reach pygofer tip.

Internal male genitalia: Lobe of oedagus broad across base and tapering posteriorly; viewed laterally, with trace of protuberance on ventral margin and a single tooth-like process on inner margin.

Color: Vertex with general ground color fulvous, lighter posteriorly, marked with white as follows: large wedges bordering inner margins of ocelli, spot at apex, mottlings along lateral margins in female. Pronotum green on disc, anterior margin yellowish green. Scutellum yellowish green. Elytra usually dull grass green, though sometimes shiny, apices lighter, smoky in male, veins whitish, hyaline apically. Face pinkish to fulvous, irregularly mottled with light brown; thorax light yellow; abdomen yellow, lateral margins of venter of female usually reddish; tibiae and tarsi tinged with fulvous.

Distribution: This common species has hitherto been recorded from South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, Virginia, Kentucky, Arizona, Texas, Nebraska, California, and Mexico. The author has studied a great number of specimens from all of the above mentioned states and in addition is adding the following: New Mexico, Arkansas, Oklahoma, Kansas, Tennessee, Missouri, and Wisconsin. It is not at all improbable that the records of *flaviceps* from Arizona, California, and Mexico are not for *flaviceps* but for one of the new species described in this paper.

Many of the records for this species state that it is destructive to wheat and oats, but since most of these records come from excessive abundance during autumn, it is probable that they are based on migrations from neighboring grasslands. Osborn records the finding of adults and nymphs on grassland adjacent to wheatfields at Raleigh, North Carolina; and on Bermuda grass at Columbia and Clemson College, S. Carolina, and in Georgia, Mississippi, and Texas.

This species has commonly been called *reticulata*,

practically all of the references to this species in the literature being under this name. In straightening out this complex, the author has been particularly fortunate in having the types of both reticulata and flaviceps before him at the same time. The types of flaviceps are : 1 female, 1875, South Carolina; 2 males and 7 females, injuring wheat and oats, February 9, 1876.

In Riley's description of this species, mention was made of the fact that this species was labeled Tettigonia flavicephalum in Fitch's collection but that it had never been described as such.

Riley's types are in the United States National Museum.

Carneocephala dyeri (Gibson)

Pl.I,fig.5,a-c; Pl.II,fig.4,a-c.

Tettigonia dyeri Gibson, Proc. Biol. Soc. Wash., XXXII,p. 85, 1919.

A rather small species, nearly black, with the veins and tip of scutellum yellow. Length, female 4.5 - 5.2 mm.; male 4 - 4.2 mm.

Head about as wide as pronotum. Vertex slightly convex except for sunken areas laterad of ocelli, sloping abruptly at apex, finely granulated; including eyes, over twice as broad as long, three times as long at middle as against the eyes in female, twice as long in male; lateral margins convex, apex slightly obtuse; ocelli much larger than in reticulata, slightly closer to posterior than to lateral margin.

Pronotum distinctly raised in female, coarsely granulated, about one-fourth longer than vertex in both sexes, posterior margin deeply emarginate.

Elytra distinctly longer than abdomen with nervures distinct; reticulations relatively few and may extend cephalad of tip of clavus.

External genitalia: Female last ventral segment over twice as long as preceding, posterior margin with emarginated median lobe not much produced, but

deeply sinuated to lateral angles; pygofer nearly three times as long as last ventral segment. Male last ventral segment longer and much wider than preceding; valve with posterior margins nearly straight; plates short and broad, not much longer than last ventral segment, barely reaching end of pygofer and bearing long finger-like processes which turn dorsad around end of pygofer.

Internal male genitalia: Lobe of oedagus distinctly widest across middle, sinuated to constricted base; in side view, with sharp tooth-like process basally, posterior processes very long.

Color: Vertex dark brownish, nearly concolorous, with light spots on inner margins of ocelli and a light spot at apex. Pronotum dark brownish with traces of vermiculate markings on anterior margin, median carina yellow. Scutellum dark brown with apex yellow, basal spots usually indistinct. Elytra dark drown to nearly black with veins yellow, hyaline apically. Face dark brownish black, clypeus lighter; thorax blackish,tinged with yellow. Abdomen varying from yellow to light brown. Legs pale, tarsi and spines brown.

Distribution: Hitherto recorded from Tegucigalpa, Honduras. The author has before him paratypes from the above locality, and a great number of specimens from Quirigua and Antiqua, Guatemala; and LeCeiba, Honduras. This material was loaned for study through the courtesy of the United States National Museum.

Carneocephala gillettei (Ball)

Pl.I,fig.8,a-c; Pl.II,fig.3,a-c.

Draeculacephala gillettei Ball, Proc. Ia.Acad. Sci., VIII, p. 72, 1901.

Carneocephala gillettei Ball, Fla. Ent., XI, p. 39, 1927.

A rather large, robust species; vertex blunt in female, about as long as pronotum. Length, female 5.8 - 6.1 mm.; male 4.8 -5.25 mm.

Head as wide as pronotum. Vertex slightly convex except for sunken areas laterad of ocelli, coarsely granulated; including eyes, twice as broad as long in male, one-half wider than long in female, three times as long at middle as against the eyes; lateral margins much more convex in female than in male, apex distinctly blunt in female, relatively acute in male; ocelli very small, slightly closer to lateral than to posterior margin.

Pronotum coarsely granulated, slightly longer than vertex in male, posterior margin slightly angularly emarginate.

Elytra longer than abdomen, nervures distinct, reticulations few and seldom extending cephalad of tip of clavus.

External male genitalia: Female last ventral segment over twice as long as preceding, posterior margin with emarginated lobe on median third, deeply sinuated to produced lateral angles; pygofer over twice as long as last ventral segment, lateral margins slightly concave. Male last ventral segment longer than preceding; valve very small, posterior margins straight; plates short and broad, scarcely longer than last ventral degment, lateral margins straight, inner margins diverging abruptly at apex, bearing finger-like processes which do not reach end of pygofer.

Internal male genitalia: Lobe of oedagus widest at base, distinctly sinuated to deeply emarginated apex,long narrow constriction between base of lobe and posterior processes; in side view, slender at tip, enlarged medially, and with basal tooth lacking.

Color: Vertex pale yellow, finely irrorate with brown;a fuscous wedge, often indistinct in female, extending from apex to middle, a fuscous line extending from base of wedge to posterior margin and with black frontal sutures to ocelli. Pronotum

yellowish green to ash gray, light yellow on anterior margin and with indistinct brown spots on anterior third parallel to anterior margin. Scutellum, yellowish green to cinereous, impressed line black, with four more or less distinct basal spots. Elytra green to cinereous, veins lighter. Face yellow irrorate with pale brown; thorax yellowish green; abdomen yellowish, tinted with red in male. Legs testaceous to cinereous, tinged with fulvous.

Distribution: Dr. E. D. Ball described this species from specimens from LaSalle and Ft.Collins, Colorado. The writer is adding Manzamba, Colorado.

Dr.E.D.Ball reports that this species has been taken only in a few isolated areas of Colorado and that species of Salicornia and Dondia may be the food plant.

In the study of this raresspecies, the author had the good fortune to be able to study three specimens of the type series, this material having been made available through the courtesy of Professors Gillette and McCampbell of the Colorado Agricultural College.

Carneocephala nuda sp. n.

Pl.I,fig.3,a-c; PlII,fig.2,a-c.

Allied to fulgida sp. n., but smaller, less robust, less shining, with shorter, blunter, and more inflated head, and with fewer reticulations in elytra. Length, female 4.5 mm.; male 4 mm.

Head slightly narrower than pronotum, including eyes twice as broad as long. Vertex slightly convex especially in male, hollowed out medially and lateřad of ocelli, finely granulated; more than twice as long at middle as against the eyes; lateral margins convex and rounding as in flaviceps; apex broadly rounding; ocelli raised, of about the same size as in fulgida; slightly closer to posterior than to lateral margins.

Pronotum less coarsely granulated than in fulgida; one-third longer longer than vertex in both sexes, posterior margin strongly emarginate.

Elytra distinctly longer than abdomen, with nervures distinct; reticulations few with practically no complete cells cephalad of tip of clavus; apex broadly hyaline with fourth apical cell very wide.

External genitalia: Female last ventral segment twice as long as preceding, posterior margin with produced lobe on median third and sinuated to lateral angles, pygofer shorter than in fulgida. Male last ventral segment only slightly longer than preceding, valve with posterior margins rounding; plates shorter than in fulgida, barely reaching end of pygofer and bearing finger-like processes.

Internal male genitalia: Lobe of oedagus wider at base and more tapered at tip than in fulgida.

Color: Vertex of female fulvous, male darker; white area around inner margin of ocelli and a light band around margin of vertex. Pronotum yellowish green, lighter on anterior margin and with a trace of a median yellow carina. Scutellum yellowish green sometimes with indistinct spots cephalad of transverse black suture. Elytra dark green; veins yellowish green, hyaline apically, slightly smoky in male. Face fulvous, mottled with white and sometimes with dark brownish indistinct arcs. Rest of underside pale yellow; legs tinged with brown.

Holotype, male, Pima Co. Ariz., July 27, 1927,

P. A. Readio. Allotype, female, same data. Paratypes, 3 males and 4 females, same data; 4 males, Mescal, Ariz., July 28, 1927, R. H. Beamer; 2 males and 3 females, Santa Catalina Mts. Ariz., Altitude 3200 ft., April 25, 1926, A. A. Nichol; 1 male, Maricopa Co. Ariz., July 1, R. H. Beamer; 1 female, same data, P. W. Oman; 1 male and 1 female, Cochise Co. Ariz., July 29, 1927, R. H. Beamer; 1 female, Tuscon, Ariz., July 7, 1924, A. A. Nichol; 6 males nd 8 females, Tlahuaillo, Durango, Mexico, 10-1000 ft. altitude, airplane collecting, September 3-12, 1929, P. A. Glick; 6 males and 4 females, Esperango, Mexico, November 8, 1917, taken on grass, E. A. McGregor; 4 males and 2 females, Presido River, Sinalos, Mexico, September 26, 1918, J. Aug. Kusche.

The external genitalia and heads of the holotype, allotype, and a paratype are figured along with the internal genitalia of a paratype from Mescal, Ariz.

The name nuda is proposed for this species because of the lack of markings on the vertex.

Some paratypes deposited in the United States National Museum; all other types deposited in Snow Entomological Collection.

Carneocephala triguttata sp. n.

Pl.I,fig.1,a-c; Pl.II,fig.5,a-c.

Allied to gillettei (Ball) but smaller and less robust with head shorter and without traces of dark markings on pronotum or scutellum. Length, female 5.4 mm.; male 4.2 mm.

Head including eyes slightly more than twice as broad as long, slightly wider than pronotum. Vertex nearly flat in male, concave in female before ocelli, finely granulated; more than twice as long at middle as against the eyes; lateral margins convex. Ocelli raised, larger than in gillettei, much smaller than in flaviceps; nearly equidistant from posterior and lateral margins.

Pronotum coarsely granulated; not more than one-fourth longer than vertex; posterior margin more deeply emarginate than in male gillettei. Elytra distinctly longer than abdomen; nervures distinct; reticulations relatively few in number and not extending cephalad of tip of clavus.

External genitalia: Last ventral segment of female over twice as long as preceding; posterior margin with produced lobe on median third, sinuated to lateral angles. Pygofer shorter than in gillettei;

nearly three times as long as last ventral segment. Last ventral segment of male distinctly longer than preceding; valve with rounded posterior margins; plates with concave margins, apices not reaching end of pygofer but bearing finger-like processes which extend to pygofer tip.

Internal male genitalia: Lobe of oedagus quite elongate, with margins slightly sinuate; in side view, thick, tip acutely pointed; posterior processes slender; ventral processes very slender and evenly tapered.

Color: General ground color of vertex tawny, lighter in female. In well marked specimens, light areas between ocelli and apex tend to form capital letter A with inclosed area dark. Apex light, surrounded by irregular black line; ocelli blackish, together with postapical spot causing vertex to appear to be three spotted. Pronotum yellowish green, of about same shade as anterior margin of pronotum. Elytra green as in gillettei, veins lighter; apical cells hyaline and smoky in male. Face light, irregularly marked with fulvous, fulvous marks sometimes in irregular lines. Underside of thorax yellowish

green, abdomen yellow; legs and tarsi pale yellowish to brownish.

Holotype, male, Coachella, Calif., July 15, 1930, D. G. Hall. Allotype, female, Holtville, Calif., July 2, 1929, R. H. Beamer. Paratypes, 1 male, same data as allotype; 1 male, Indio, Calif., July 24, 1929, R. H. Beamer; 12 males and 15 females, same data as holotype; 1 female, Calexico, Calif., August 20, 1931, H. W. Capps; 6 males, Palm Springs, Calif., T. F. Winburn and R. H. Painter; 7 males and 6 females, Laws, Calif., Owne's Ranch, November 16, 1914, A. Wetmore; 9 males and 4 females, El Centro, Calif., E. A. McGregor; 1 male, Westmoreland, Calif., E. A. McGregor.

The specimens collected by E. A. McGregor at El-Centro, Calif., taken on alfalfa and cotton, were referred to as sagittifera by Olsen (Bull. Brooklyn Ent. Soc.,XIII, No 5, 1918).

The heads and internal genitalia of the holotype and allotype are figured along with the internal genitalia of a male paratype from Coachella, Calif.

Some paratypes deposited at the Kansas State College and in the United States National Museum; all other types deposited in the Snow Entomological Collection.

Carneocephala reticulata (Signoret)

Pl.I,fig.4,a-c; Pl.II,fig.1,a-c.

Tettigonia reticulata Signoret, Ann. Soc. Ent. Fr., ser. 3, II, p. 22, pl. 2, fig. 10, 1854.

A small robust species with fulvous vertex and with pronotum and scutellum at most but faintly marked. Length, female 4.2 mm.; males 3.4 -3.5 mm.

Head about as wide as pronotum. Vertex with sunken areas laterad of ocelli, posterior margin slightly raised in female, finely granulated; including eyes over twice as wide as long, two and one-half times as long at middle as against the eyes in female, less than twice as long in male, lateral margins convex, apex very blunt; ocelli small, slightly closer to posterior than to lateral margin.

Pronotum rather coarsely granulated, less than one-third longer than vertex, posterior margin deeply emarginate.

Elytra longer than abdomen with nervures distinct, apex with relatively few reticulations which seldom extend cephalad of tip of clavus.

External genitalia: Female last ventral segment

much over twice as long as preceding, posterior margin with produced median lobe wgich is deeply sinuated to rounded lateral angles; pygofer over twice as long as last ventral segment. Male last ventral segment slightly longer than preceding, valve with rounded posterior margins; plates with straight margins, only slightly longer than last ventral segment, failing to reach end of pygofer, but bearing finger-like processes which bend dorsad reaching pygofer tip.

Internal male genitalia: Lobe of oedagus subovate, evenly rounded, constriction at base rather long, in side view thick, with short, sharp basal tooth.

Color: Vertex with general ground color fulvous, fuscous wedge cephalad of middle extending to white spot at apex, large white areas on inner margins of ocelli, sometimes additional white marks around dark wedge and on lateral margins of vertex. Pronotum yellowish green with four rather indistinct brown spots on cephalic third. Elytra sage green, smoky apically; veins yellowish green, hyaline apically. Face light fulvous, rather mottled and with irregular arcs formed by darker brown;

thorax yellowish green; abdomen yellow. legs pale, tarsi and spines brown.

Distribution: Hitherto reported from Cuba. The author is adding the following localities: Isle of Pines; Jamaica; Haiti; Dominican Republic; and Canal Zone. The material from the last four localities is not as typical as are the Cuban and Isle of Pines specimens.

It will be seen that this species, as now understood, has not been recorded from the United States.

Through the courtesy of the Vienna museum, the author has been able to study Signoret's type of this species from Cuba. The type, which is rather mutilated, is closest to sagittifora (Uhler), but very distinct from flaviceps (Riley) and dyeri (Gibson).

Carneocephala sagittifera (Uhler)

Pl.I,fig.2,a-c; Pl.II,fig.7,a-c.

Tettigonia(Diedrocephala) sagittifera Uhler, Proc. Zool. Soc. Lond., p. 76, July 15, 1895.

Draeculacephala sagittifera Olsen, Bull. Brook. Ento. Soc., XIII, No. 5, December, 1918.

Carneocephala sagittifera Ball, Fla. Ent. , XI, p. 40, 1927.

Tettigonia diducta Fowler, Biol. Centr. Am., Homop.,II, p. 274,pl. 18, fig. 17, 1900.

A small brownish-green species with black arrow on vertex; pronotum with brownish vermiculations and scutellum with spots. Length, female 4.5 mm; male 4 mm.

Head including eyes as wide as pronotum, wider in female, twice as wide as long. Vertex slightly depressed before ocelli; finely granulated; more twice as long at middle as against the eyes, lateral margins slightly convex, apex roundingly acute; ocelli relatively small, slightly closer to posterior than to lateral margin.

Pronotum one-third longer than vertex in male; less than one-fourth longer than vertex in female;

relatively finely granulated and rather deeply emarginate on posterior margin.

Elytra longer than abdomen with nervures narrow but distinct on basal three-fourths, becoming rather indistinct in reticulated area; reticulations much less numerous than in flaviceps and not extending cephalad of tip of clavus.

External genitalia: Female last ventral segment over twice as long as preceding, posterior margin with produced lobe on median third and not deeply sinuated to lateral angles; pygofer twice as long as last ventral segment. Male last ventral segment much longer than preceding; valve with posterior margins rounding, apex slightly produced; plates with lateral margins distinctly concave, slender at apices, reaching end of pygofer and bearing finger-like processes.

Internal male genitalia: Lobe of oedagus of nearly uniform width, apex bluntly rounded, not showing basal tooth in lateral view; ventral processes heavy and evenly tapered.

Color: Vertex fulvous, darker in male with a median fuscous line extending caudad from a dark post-apical arrow to posterior margin, and marked

with paler marks as follows: spot at apex, spots around ocelli, lateral margins, lines or spots around post-apical arrow, and two to four spots on posterior margin. Pronotum dark yellowish green, nearly yellow anteriorly with fuscous vermiculations on anterior third. Scutellum light yellowish green with two or three dark spots cephalad of impressed line, and a dark wedge in each basal angle. Elytra brownish green, nervures yellowish green, hyaline posteriorly, apical cells slightly smoky in male. Face fulvous mottled with white: thorax light yellowish green; abdomen yellow. Legs semihyaline tinged with fulvous.

Distribution: This species has hitherto been recorded from Texas and California by Olsen. Ball adds West Indies and Utah with the note that at St. George, Utah, he took it on Dondia and Atriplex. The record from California is a record for triguttata sp. n., and the Utah record probably refers to one of the new species herein described. The author has a great deal of material before him from the following localities: Cameron, Colorado, Caddo, Brazoria, Brooks, Hidalgo, Jim Wells, Bee, Starr, Orange, and

Victoria counties, Texas; Calcasieu and Orleans counties, Louisiana; Virginia; in the West Indies, Virgin Islands, Grenada, Tobago, Trinidad, Porto Rico, and Dominican Republic; in Mexico, Vera Cruz and Guerrero.

Uhler's description is from specimens from Vincent, West Indies.

In the study of this species, the author has been greatly aided by the use of speciments from the Virgin Islands, compared with Uhler's types in the United States National Museum by P.W.Oman.

Through the courtesy of W.E.China of the British museum, the author has been able to examine one of Fowler's types of Tettigonia diducta from Orizaba, Mexico. T. diducta is a synonym of sagittifera and not of reticulata as has commonly been thought.